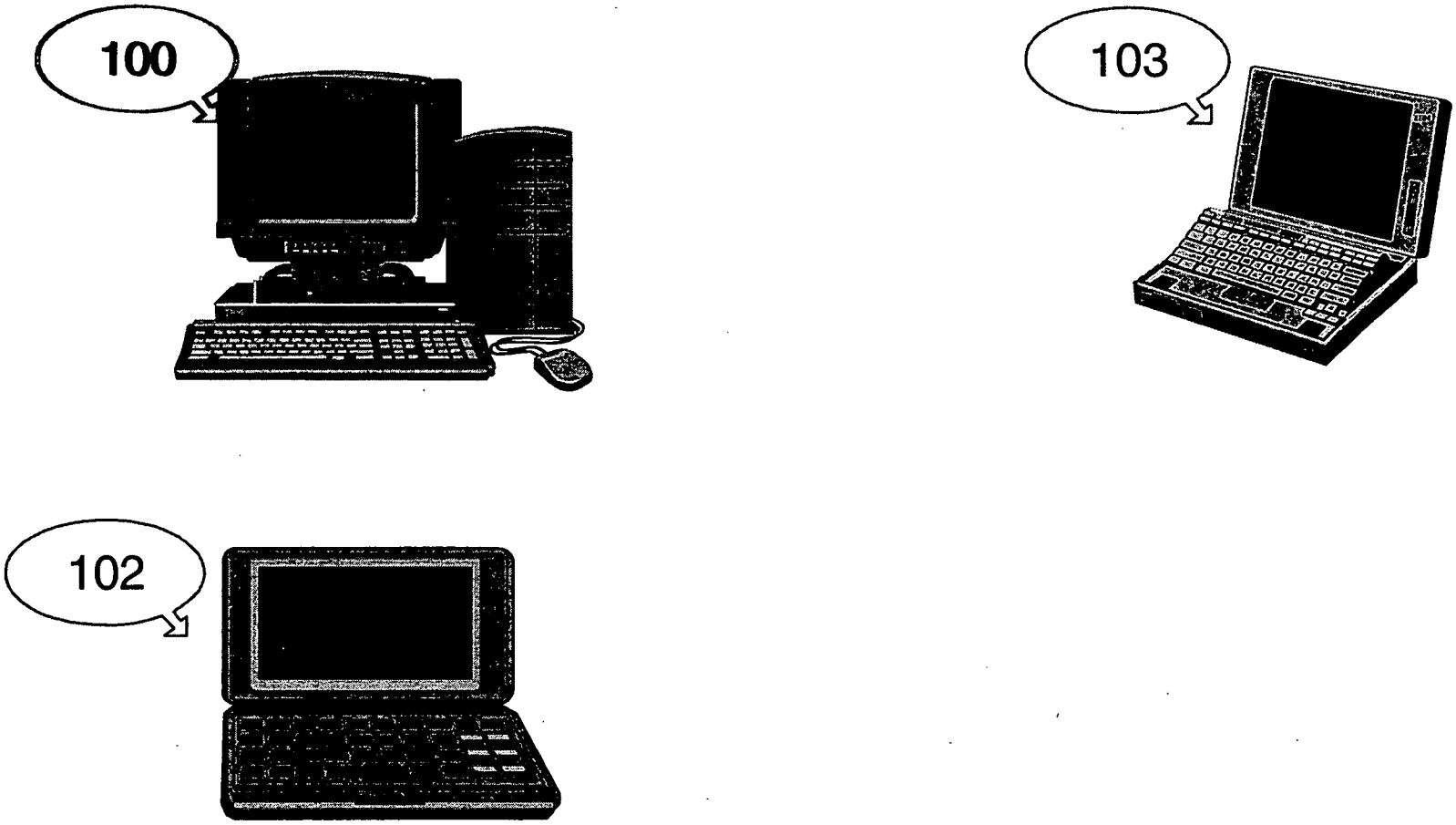

FIG 1. Target platforms for the invention

Student(*SID,Sname, major)

Class(*CID, Cname, Time, room)

Student_class(*SID,*CID)

Old way - Use Student_class to model relationship

Student(*SID,Sname, major,CIDBS)

Class(*CID, Cname, Time, room,SIDBS)

New way - Use BITSETs CIDBS and SIDBS to model relationship

Figure 2. Old-New schema for modeling relationships

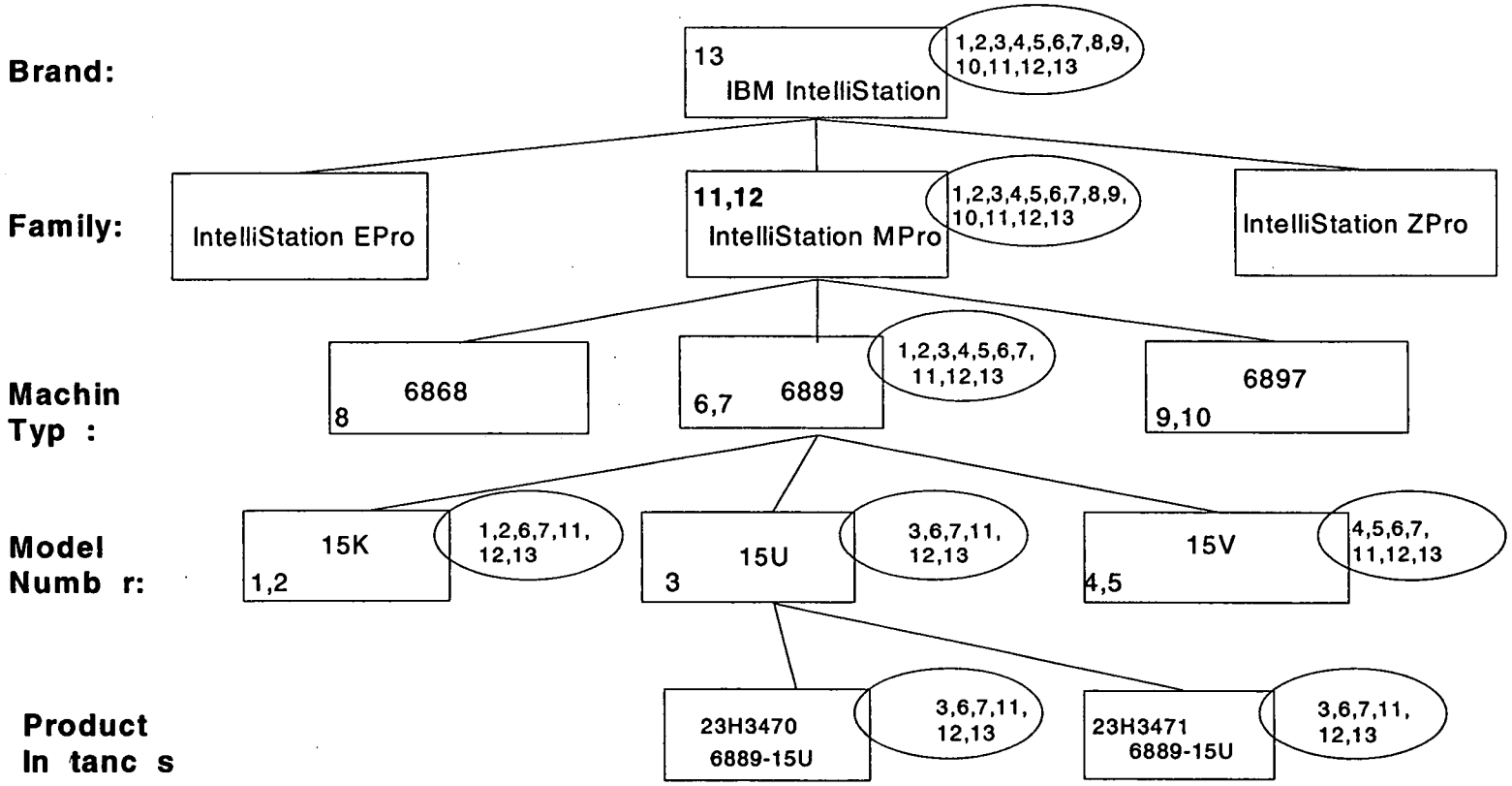

Figure 3. An example of inference of product-category associations for documents.

401 Old way

CATEGORY(CATEGORYID BIGINT)
DOCUMENT(DOCUMENTID BIGINT)
PARENTCHILDASSOCIATIONS(CHILDID BIGINT, PARENTID BIGINT)
CATEGORYDOCUMENTASSOCIATIONS(CATEGORYID BIGINT,
DOCUMENTID BIGINT)

402 New way

CATEGORY(CATEGORYID BIGINT, BSDOCUMENT BITSET,
BSPARENT BITSET, BSCHILD BITSET)
DOCUMENT(DOCUMENTID BIGINT)

Figure 4: Old/New way to represent categories

NOR Rules: Input All FALSE => Output TRUE

Input TRUE Expressions	ANDIsEmpty evaluates to FALSE	returns FALSE NOR Rules
Input FALSE Expressions + Optional	ANDEquals evaluates to TRUE	returns TRUE NOR Rules

OR Rules: Input All FALSE => Output FALSE

Input TRUE Expressions	ANDIsEmpty evaluates to FALSE	returns TRUE OR Rules
Input FALSE Expressions + Optional	ANDEquals evaluates to TRUE	returns FALSE OR Rules

NAND Rules: Input All TRUE => Output FALSE

Input TRUE Expressions + Optional	ANDEquals evaluates to TRUE	returns FALSE NAND Rules
Input FALSE Rules	ANDIsEmpty evaluates to FALSE	returns TRUE NAND Rules

AND Rules: Input All TRUE => Output TRUE

Input TRUE Expressions + Optional	ANDEquals evaluates to TRUE	returns TRUE AND Rules
Input FALSE Expressions	ANDIsEmpty evaluates to FALSE	returns FALSE AND Rules

Figure 5: Boolean Expression Evaluation with BITSETs